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Fishmeal supplementation during pregnancy may help protect against maternal stress-induced programming of the ovine fetal neuroendocrine-immune system

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Abstract

Adverse uterine environments caused by stressors such as an infection during pregnancy can alter developmental programming of the fetus increasing the risk of adulthood inflammatory disease. Supplementation with fishmeal (FM; rich in anti-inflammatory omega-3 polyunsaturated fatty acids; n-3 PUFAs) during pregnancy may help to reduce this risk. To test this hypothesis, 53 ewes were allocated to either a diet supplemented with FM or soybean meal (SM; rich in n-6 PUFAs), and on gestation day 135 (gd135) half the ewes from each dietary treatment were challenged with either 1.2 □g/kg lipopolysaccharide (LPS) to simulate a bacterial infection, or saline as control (CON). The stress response of the offspring was assessed at weaning + ACTH challenge, and during adulthood by LPS challenge. Immune responsiveness of the adult offspring was assessed with a skin hypersensitivity test using antigens ovalbumin (OVA) and candida albicans (CAA), and by measuring the OVA-specific serum antibody response. The FM+LPS treatment lambs had the greatest cortisol response compared to all other treatment groups during both weaning and LPS challenge. In contrast, the SM+LPS lambs had a greater cortisol response compared to the SM+CON treatment group during weaning + ACTH challenge. The SM+LPS offspring had the greatest hypersensitivity response to both OVA and CAA as well as the greatest serum IgG response to OVA compared to all other treatment groups. These data suggest that FM may help protect the offspring from immune system programming during maternal infection. Future studies need to focus on the mechanisms behind these alterations.

Biography

Niel Karrow received his Ph.D. in biology from the University of Waterloo with a focus on toxicology. He was a post-doc fellow in both the Department of Pharmacology and Toxicology at the Medical College of Virginia- Virginia Commonwealth University, Richmond VA, and in the Department of Pathobiology, University of Guelph. He is currently an Associate Professor at the University of Guelph and holds a joint appointment with the departments of Animal & Poultry Science and Biomedical Sciences. He has published 87 peer-reviewed journal articles, is a member of the Center for the Genetic Improvement of Livestock, and is involved in the interdepartmental toxicology program. His research interests include immunoregulation and immunogenetics.